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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/990,965 | 11/21/2001 | Xiang Liu | LIU-4-4-8 | 3316 |

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| EXAMINER | |
|---|---|
| LEE, DAVID J | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2633 | |

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/990,965 | LIU ET AL. | |
| | Examiner | Art Unit | |
| | David Lee | 2633 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *28 September 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 7-9, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mamyshev (US Patent No. 6,072,615) in view of Sharma et al. (US Patent No. 6,081,355).

Regarding claims 1, 7, 9, and 15, Mamyshev teaches an optical communication system arranged to transmit at least one stream of input data from a transmitter to a remote receiver (fig. 1), said system comprising, a transmitter comprising means for generating a stream of RZ optical pulses (16 of fig., 1), and means for modulating the phase of said optical pulses (14 of fig. 1) as a function of input data applied to said transmitter (28 of fig. 1) to encode said input data onto said stream of RZ optical pulses (col. 2, lines 20-22 and lines 44-45); and an optical communication channel for transmitting the modulated optical pulses from said transmitter to said remote receiver (col. 8, lines 18-20). Although Mamyshev does not expressly disclose that the generating means generates alternate pulses in the stream having essentially orthogonal polarizations, he does disclose that "other types of RZ data generators, providing a variety of different RZ electrical signal shapes, may also be used to generate an RZ electrical data stream suitable for application to the phase modulator" (col. 2, lines 40-43). The technique of generating a stream of pulses wherein the pulses in the stream are orthogonally polarized is well known and widely used in the art of high bit rate optical communication systems. For example,

Sharma discloses a means for generating a stream of optical pulses wherein alternate pulses have essentially orthogonal polarizations (see fig. 3 and also col. 2, lines 48-52). After the orthogonal polarized pulse stream is generated, the pulse train is sent through a demultiplexer for individual modulation of the data. In addition to the advantages of decreasing four-wave mixing (FWM) and self-phase modulation (SPM), a skilled artisan would have been motivated to generate an orthogonally polarized pulse stream in order to eliminate the need for replacing a fiber with a polarization maintaining fiber, thereby cutting system costs (col. 4, lines 51-55). Therefore, it would have been obvious to a skilled artisan at the time of invention to use the generating means as disclosed by Sharma in the system of Mamyshev in order to optimize system performance and decrease component costs.

Regarding claims 8 and 16, the combined system of Mamyshev and Sharma teaches a demodulator for recovering at least one stream of input data from the modulated optical pulses received from a remote receiver (receivers consist of demodulators to recover data).

3. Claims 2 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mamyshev in view of Sharma and in further view of Ono et al. (US Patent No. 6,097,525).

Regarding claims 2 and 10, the combined invention of Mamyshev and Sharma teaches the limitations of claims 1 and 9 but does not expressly disclose that the modulating means is a phase shift keyed (PSK) modulator. However, PSK modulation schemes are well known in the art, as is disclosed and illustrated by Ono (col. 8, lines 2-8; fig. 12) and are one of a plurality of modulation formats available to an artisan. A skilled artisan would have been motivated to use a PSK modulator in order to take advantage of the superiority in noise-proof capabilities

characterized in PSK schemes. Therefore it would have been obvious to a skilled artisan at the time of invention to use the PSK modulation technique of Ono in the system of Mamyshev and Sharma in order to allow transmission of healthier signals.

4. Claims 3 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mamyshev in view of Sharma and in further view of Miyamoto et al. (US Pub. No. 2003/0002121 A1).

Regarding claims 3 and 11, the combined invention of Mamyshev and Sharma teaches the limitations of claims 1 and 9 but does not expressly disclose that the modulating means is arranged to modulate said optical pulses in accordance with the differences between successive bits in said input data. This modulation scheme, also known as differential phase shift key modulation (DPSK) is well known in the art and is one of a plurality of modulation formats available to an artisan. For example, Miyamoto, from a similar field of endeavor, discloses an optical transmission system wherein the binary optical pulses are phase modulated using a DPSK format (Abstract; fig. 1). A skilled artisan would have been motivated to use the DPSK modulation scheme of Miyamoto in order to asynchronously detect the modulated data transmitted from a transmitter during the data demodulation and to easily resolve phase ambiguities at a receiver, thereby simplifying the demodulation process. Therefore it would have been obvious to a skilled artisan at the time of invention to utilize DPSK modulation as indicated by Miyamoto in the system of Mamyshev and Sharma in order to have a simpler and cost-efficient receiver.

5. Claims 4-6 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farries et al. (US Patent No. 6,819,872 B2) in view of Mamyshev.

Regarding claims 4 and 12, Farries teaches a transmitter for use in an optical communication system (fig. 2), said transmitter comprising means for generating first and second streams of RZ optical pulses in which pulses is said first stream have essentially orthogonal polarizations with respect to pulses in said second stream (col. 2, lines 4-10), and means for modulating the RZ optical pulses in said first and second streams as a function of first and second streams of input data applied to said transmitter, respectively, to encode said first and second streams of input data onto said first and second streams of optical pulses, respectively (col. 2, lines 19-29). Farries does not expressly disclose the specific type of modulation used, but he does disclose that the modulators are of the $LiNbO_3$ balanced Mach-Zehnder type (col. 2, lines 20-21). However, the use of phase modulation to modulate optical pulses as a function of input data is well known in the art. For example, Mamyshev discloses an optical transmission system in which an RZ data stream is modulated using a phase modulator (see Abstract; and fig. 1). Since phase modulators encode data with respect to phase instead of intensity, a skilled artisan would have been motivated to use a phase modulator to encode data onto a pulse stream in order to avoid intensity related problems, such as incorrect intensity detection at a receiving terminal. Therefore it would have been obvious to a skilled artisan at the time of invention to use the modulator of Mamyshev in the system of Farries in order to accurately detect signals regardless of intensity-related problems.

Regarding claims 5 and 13, the combined invention of Farries and Mamyshev teaches the limitations as applied to claims 4 and 12 including the limitation that the first and second streams

of optical pulses each have the same first wavelength (both streams come from source 201 of fig. 2). Farries does not specifically disclose that the transmitter further includes a wavelength division multiplexer for combining the output of said modulation means with at least a second modulated optical signal having a wavelength different from said first wavelength. However, Examiner takes official notice that multiplexing modulated signals of different wavelengths is well known in the art. One of ordinary skill in the art would have been motivated to multiplex the two wavelengths together in order to increase transmission capacity. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate a WDM in the transmitter of Farries.

Regarding claims 6 and 14, the combined invention of Farries and Mamyshev teaches that the optical pulses are solitons (Farries: col. 2, line 13).

***Response to Arguments***

6. Applicant's arguments filed on 9/28/2005, with respect to the rejections of claims under 25 U.S.C. 102 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground of rejection is made in view of the newly found prior art.

7. Applicant's amendment filed on 3/9/2005 necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patent No. 6,391,022 B1 is cited to show a generating means that generates alternate pulses in the stream having essentially orthogonal polarizations (fig. 1).

US Patent No. 6,587,239 B1, US Pub. No. 2002/0021464 A1, US Patent No. 6,496,297 B1 are cited to show means for modulating the phase of optical pulses) as a function of input data to encode the input data onto a stream of optical pulses

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Lee whose telephone number is (571) 272-2220. The examiner can normally be reached on Monday - Friday, 9:00 am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DL

M. R. Sedighian

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PRIMARY EXAMINER